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AN EXPERIMENTAL WORK ON CRUSHED CERAMIC WASTE TILES BY COARSE AGGREGATE IN CONCRETE MIX

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1. ABSTRACT: *The use of waste materials in concrete production is very helpful to reach the goal of the sustainable construction. Therefore, this study considered to use ceramic tile aggregate in concrete production. Ordinary Portland Cement 43 grade and coarse aggregate were used to produce standard concrete cubes, beams and cylinders. Compressive strength tests were carried out on concrete specimens at various stages. The crushed tiles is an industrial waste material, and then reuses it in the construction fields will reduce the concrete costs and reduce the environmental pollution. The general properties, such as the specific gravity and water content of the natural crushed aggregate and the crushed ceramic tile aggregates were tested and compared with natural aggregates. Four different replacement percentages of crushed tile aggregates 0%, 10%, 20% and 30% were used in the concrete mix. In general, the results confirm that increasing the W/C will cause to increase the workability and decrease the compressive strength of the concrete mix that with crushed ceramic waste tile aggregates.*

Keywords- Sustainable construction ,specific gravity, water content, crushed tiles.

2. INTRODUCTION

Nowadays, one of the serious problem is the management and collection of the waste materials. In concrete, a huge amount of coarse aggregates, fine aggregates and water are being consumed. To minimize these, we are using waste materials. For sustainable development we are using crushed waste tiles, fly ash, stone dust, plastics wastes, broken glass pieces, rice husk ash, coconut shells, marble waste powder, fiber etc are used in concrete to give strength to the concrete. By using these we will get the more strength as compares to the conventional concrete. A large amount of tiles gets broken or wasted in tiles industries. The unutilized wastes are disposed into environment. The utilization of waste materials like fly ash, ceramic waste, marble powder waste, plastic waste and electronic waste will not only reduce the cost of construction and also improve the safe disposal of waste materials. For the production of the ceramic tiles, India is ranked third in the world. The ceramic tiles are the essential construction material which is used in almost all buildings. The production of crushed tiles is starts from grinding and mixing, firing and polishing, glazing, granulating by spray drying. Ceramic tile wastes are manufacture as a result of the ceramic processing. These wastes are the reason of the air pollution, soil pollution and the groundwater pollution. Crushed ceramic waste tiles can be obtained free of cost and they are used to partially replace the coarse aggregates. Replacement of coarse aggregates with ceramic waste tiles in different proportions of 0%, 10%, 20% and 30% with water cement ratio 0.4 and with admixture sikka plast, it is a water reducing agent. Test is perform for 7, 14 and 28 days. The test perform for the strength are compressive strength (for cubes),spilt tensile strength (for cylinder) and flexural strength (for beams).

3. MATERIALS

a) Coarse aggregates: Coarse aggregate is passed through 10mm sieve.

b) Fine aggregates: The sand which was locally available and passing through 4.75mm IS sieve is used. Sand passing through IS 4.75mm Sieve will be used for casting all the specimens.

c) Cement: OPC (Ordinary Portland Cement) grade 43 which is confirming to IS 10262:2009.

d) Water: Portable water is used which should be free from organic matter and curing is done as per IS 456:2000.

e) Ceramic tile aggregates: Ceramic tile aggregate is crushed to about size of 20mm. The crushed tile is used in concrete.

4. REVIEW OF LITERATURE

4.1 Nishant Kumar, Aravind Sagar:

Coarse aggregates was partially replaced by crushed waste ceramic tiles in the proportion of 0%, 10%, 20%,

30% and 40% ,super plasticizer as 0.4% and 0.4 water cement ratio was used taken. At 20% maximum compressive strength is 49.53,spilt tensile strength is 3.37 and flexural strength is 7.29,strength start decreasing from30%.Test for strength of concrete are performed for 7,14 and 28 days. Result shows that there is an increase in strength of concrete till 20%.

4.2 Parminder Singh,Dr. Rakesh Kumar Singla:

Coarse aggregates are replaced by waste ceramic tile. Mix design of M20, M25 and M30 are made by replacing coarse aggregates in 0%,5%,10% and 15% for 28 days. At 0% M30 maximum compressive strength is 38.73,at 5% M30 maximum compressive strength is 33.99,at 5% M20 compressive strength is 28.21 is attain.

4.3 Amir Javed, Salman Siddique, Ram Prasad:

Did investigation on ceramic waste and stone dust as aggregate replacement in concrete. The optimum percentage for replacement of stone dust with fine aggregate along with 20% replacement of coarse aggregate by ceramic tiles.

4.4 S. DeepaBalakrishnan., and K. C. Paulose:

Studied the workability and strength characteristics of self-compacting concrete concrete containing fly ash and dolomite powder. It has been observed that the use of fly ash in SCC mixes reduces the possibility of bleeding and segregation, and increases the fill and passing ability of concrete, whereas dolomite powder imparts viscosity to the concrete and improves the segregation resistance of the concrete.

4.5 Umapathy U, Mala C, Sivak:

Did assessment of concrete strength using partial replacement of coarse aggregate for waste tiles and cement for rich husk ash in concrete. Study concluded as the aggregates in a concrete mixture. This contributes to reducing the unit weight of the concrete. This is useful in applications requiring non-bearing light weight concrete, such as concrete panels used in facades, foot path.

4.6 Deepthi C G, Shindon Baby:

It studied on compressive strength of concrete with dolomite power and crushed tiles. This study aims to create a better concrete in low cost and is focused on the compressive strength of the concrete by partially replacing cement with dolomite powder and coarse aggregates with crushed tiles. Results obtained are analyzed and the optimum mix with maximum strength is determined.

5. CONCLUSION

1) In conclusion, the density of the concrete is decreased with the increase in the amount of the coarse ceramic waste tile aggregates.

2) The compressive strength of the concrete is increased with the percentage of the coarse ceramic wastes tiles aggregates when it is compares to the conventional concrete.

3) The coarse ceramic waste tiles aggregate has a positive effect on the environment which is obtained at a very low rate.

4) When increasing in the proportion of the crushed ceramic tile aggregate in the concrete, the workability of the concrete is also increased.

5) The compressive strength of the concrete is increased when the water cement ratio of the concrete is decreased.

6. REFERENCES

1) Parmimder singh, Dr. Rakesh kumar Singla, Utilization Of Waste Ceramic Tiles As Coarse Aggregate In Concrete, Vol. 2 Issue 11, November - 2015

2) Nishant Kumar1, Aravind Sagar B,An Experimental Laboratory Study on Utilization of Ceramic Waste as a Partial Replacement of Coarse aggregate in concrete, Volume: 05 Issue: 11 |Nov-2016

3) Hemanth Kumar Ch1,Ananda Ramakrishna K2, Sateesh Babu K3, Guravaiah T4, Naveen N5, Jani Sk ,june-2015, Effect of Waste Ceramic Tiles in Partial Replacement of Coarse and Fine Aggregate of Concrete, Vol. 2, Issue 6, June 2015

4)E. E. Ikponmwosa1,* and S. O. Ehikhuenmen2, the effect of ceramic waste as coarse aggregate on strength properties of concrete,Vol. 36, No. 3, July 2017

5) N.Naveen, Prasad1, P.Hanitha2 , N.C.Anil, Dec. (2016), Partial Replacement of Coarse aggregate by Crushed Tiles and Fine aggregate by Granite Powder to improve the Concrete Properties, Volume 13, Issue 6 Ver. V (Nov. - Dec. 2016).

6) Wadhah M.Tawfeeq1, Maryam AlSaidi2, Abdullah Al-Kamzari2, Mohammed Al-Shibli2, and Zainab Al-

Mamari,2016, Using Crushed Tiles as Coarse Aggregate in Concrete Mix, Vol. 3, Issue 2 (2016)

7) Deepthi C G1, Shindon Baby2 , September-2016, Study on Compressive Strength of Concrete with Dolomite Powder and Crushed Tiles**,** Vol. 5, Issue 9, September 2016.